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Exploring the technological pedagogical content knowledge of pre-service teachers in language education

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Abstract

The teacher education programs are concerned not only with pre-service teachers' use of technology but also with their development of knowledge related to the use of technology as a pedagogical tool in teaching; that is, the development of technological pedagogical content knowledge (TPCK), modeled by Mishra and Koehler (2006). The purpose of this study is to explore how TPCK develops in pre-service English-as-a-Foreign Language (EFL) teachers enrolled in the required computer-assisted language learning (CALL) course. Interviews were gathered to explore the progress of their TPCK during the course. Development of TPCK in the participants is evidenced in their analysis of different functions of TPCK such as understanding what it means to teach English language with technology; knowledge of instructional strategies; knowledge of students' learning; knowledge of materials that integrate technology in language teaching.

Keywords: Teacher education; tachnological pedagogical content knowledge; english-as-a-foreign language teaching

1. Introduction

Current educational practice reflects a growing integration of computer tools and technological applications into their curriculum. The idea of integrating the knowledge of subject matter, teaching/learning, and technology has become apparent today since the needs of students have increased with the increased use and the need to learn with technology. Therefore, knowledge of technology, pedagogy, and subject matter has become an integral part of teacher education programs in order to prepare their pre-service teachers to teach using technology in their teaching. Shulman (1987) defines the knowledge of teaching a subject matter as pedagogical content knowledge (PCK):

> Pedagogical content knowledge identifies the distinctive bodies of knowledge for teaching. It represents the blending of content and pedagogy into an understanding of how particular topics, problems or issues are organized, represented, adapted to the diverse interests and abilities of learners, and presented for instruction. Pedagogical content knowledge is the category most likely to distinguish the understanding of the content specialist from that of the pedagogue. (p. 4)

Now the knowledge benchmark that teachers need in order to teach their subject matter with technology is more than just PCK, it needs the development of "Technology Pedagogical Content Knowledge (TPCK)"(Mishra and Koehler, 2006; Niess, 2005). Building on Shulman's idea of PCK, Mishra and Koehler (2006) have added technology to PCK, and described TPCK as the interweaving of technology, pedagogy, and content:

> TPCK is the basis of good teaching with technology and requires an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students' prior knowledge and theories of epistemology;

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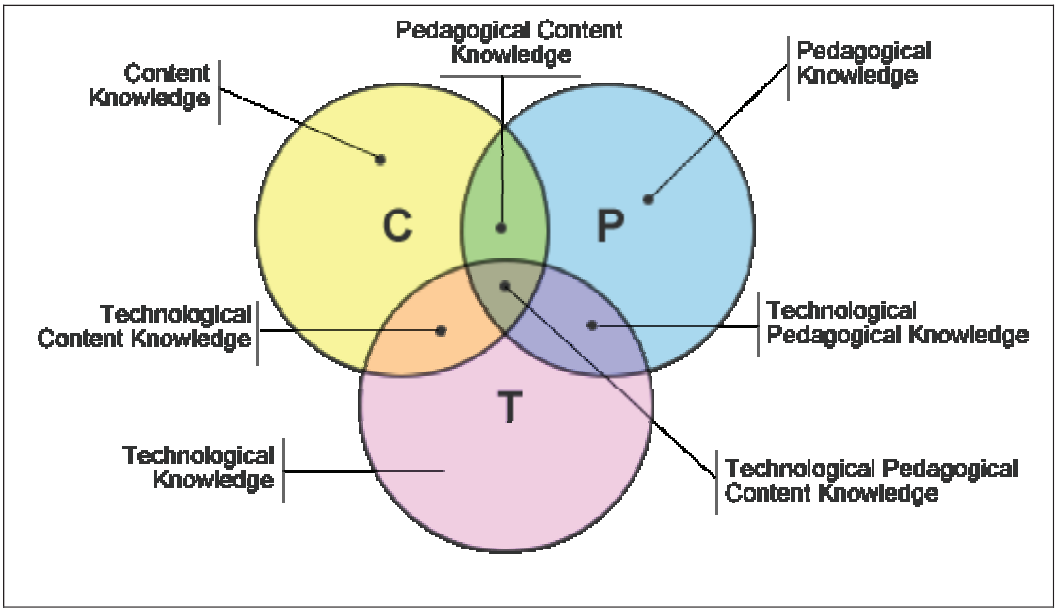
and knowledge of how technology can be used to build on existing knowledge and to develop new epistemologies or strengthen old ones. (Mishra & Koehler, 2006, p. 1029)



Niess (2005) elaborated on TPCK as (1) an overarching conception of what it means to teach a particular subject integrating technology in the learning; (2) knowledge of instructional strategies and representation for teaching particular topics with technology; (3) knowledge of students' understanding, thinking, and learning with technology in a particular subject; (4) knowledge of curriculum and curriculum materials that integrate technology with learning in the subject area. Consequently, teacher education programs must prepare pre-service teachers to integrate various technologies into their teaching, learn new skills for working with them in classrooms, and learn to address many of the pedagogical issues that arise when using technology in teaching.

Computers are becoming increasingly common in language teacher education, including many English as Foreign/Second Language (EFL/ESL) curricula. Therefore, it is language teacher education programs' responsibility to take advantage of technology in order to equip their students with the experience and knowledge of using computers. Hanson-Smith (2003) believes that

> technology-using *language* (italics are mine) teachers today are leading the way in innovative teaching ideas, the exploration of culture and language, the inclusion of special needs learners, the promotion of student autonomy, and anywhere-anytime learning" (abstract)

Technologies are evolving on a daily basis. In cooperating various technological applications in the language classroom can range from using blogs in writing to various computer-mediated communication activities. Therefore, language teachers must be aware of the effective use of technology within a teaching strategy as a pedagogical tool. TPCK involves an awareness of strategies and knowledge that incorporate the use of technology to enhance language learning. Studies are just beginning to appear in the literature exploring the importance and development of TPCK. However, how language teachers develop their TPCK has not been explored and studied. Most of the studies on integrating technology in teacher preparation programs focus on math and science education (Keating and Evans, 2001; Kersaint, 2007; Margerum-Leys and Marx, 2002, 2003; Koehler and Mishra, 2005a, 2005b, 2008; Niess, 2005; Koehler, Mishra and Yahya, 2007), but none on language education. Therefore, the purpose of this study is to explore how TPCK develops in pre-service English-as-a-Foreign Language (EFL) teachers enrolled in a required MA computer-assisted language learning (CALL) course.

2. The study

This study aims to discuss technological pedagogical content knowledge from pre-service EFL teachers' perspective in Turkey. How pre-service EFL teachers use their language teaching knowledge, technology knowledge and pedagogical content knowledge was also examined.

The present study was conducted in the Department of Foreign Language Education, which offers a four-year undergraduate program in English Language Teacher Education. The basic components of this program consist of English language development, linguistics and field-specific courses such as foreign language teaching methodology. The researcher conducted this study within the context of an undergraduate course developed by the researcher herself. The purpose of this course was to

familiarize students with a variety of the computer technology and help students to formulate new ideas about how to utilize this computer technology in teaching English not only in the context of being a student teacher but also in their classrooms when they become teachers by exploring and producing a variety of computer technology projects.

2.1. Participants

Participants were 27 pre-service EFL teachers studying in the 4th year of their teacher training in a Turkish university. All these student teachers were graduates of State Teaching Schools for teacher candidates. The age range of the group was between 20 and 22. They had been learning English for approximately 12 years, in the classroom setting in Turkey.

2.2. Data collection

The goal of this study was to explore EFL pre-service teachers' beliefs about TPCK; therefore, the methodology was grounded in an interpretive approach. Interviews were conducted with participants focusing on their beliefs about TPCK including the beliefs on improving language teaching content knowledge, pedagogical practices, and use of technology. The open-ended questions in the interviews allowed the researcher to get a detailed understanding of the participants' TPCK development at the end of the course.

2.3. Data analysis

Twenty-seven open-ended survey responses were independently categorized by using TPCK as an analytic framework:

1. Content Knowledge – A response that was language teaching content specific.
2. Pedagogical Knowledge – A response that emphasized the general methods of teaching and learning.
3. Technological Knowledge – A response about the use of technology.
4. Pedagogical Content Knowledge – A response that shows the relationship between language teaching subject knowledge and the ways to explain this knowledge to others.
5. Technological Content Knowledge – A response that shows an understanding of how technology influences language teaching knowledge including the representations of a concept or procedure through technology.
6. Technological Pedagogical Knowledge; and
7. Technological, Pedagogical, Content Knowledge.

3. Results and Discussion

Applying the framework established by Mishra and Koehler (2006), the findings addressed the evidence of ideas in technology-related knowledge areas in the pre-service teachers as they worked through the CALL course.

Table 1 –Pre-service teachers' ideas on TPCK

categories	Number (%)	Example quotations
Content Knowledge	6 (7.6%)	I learned a lot in this course. It was like a summary of what I learned in my program.
Pedagogical Knowledge	4 (5.1%)	The content of the course integrated language teaching models also, so I benefited from it.
Technological Knowledge	9 (11.5%)	I did not know how to use Dreamweaver program; but now I can design a web page.
Pedagogical Content Knowledge	18 (23%)	While creating materials, we also collaborated and worked in a group; so it made me aware that collaboration will really work in language teaching.
Technological Content Knowledge	11 (14.1%)	In creating blogs, I worked with my friend and discussed new ideas about using technology in writing. I liked these discussions because it was helpful for me to apply new technology in writing.
Technological Pedagogical Knowledge	16 (20.5%)	What I learned from this class is that I could use different multimedia applications in my language classes to enhance motivation and creativity.
Technological Pedagogical Content Knowledge (TPCK)	13 (16.6%)	At the end of the term, I realized that I know not only different kinds of technological applications, but also how to use them in teaching English especially in teaching oral communication and writing. It was a great experience for me to create materials by myself that I can actually use in my practice teaching.

The pre-service teachers mostly discussed about their pedagogical content knowledge as shown in Table 1. This finding is very expected because they are 4th year students doing their practicum, so they were aware of the interplay between language teaching subject knowledge and the ways to represent and explain this knowledge to students.

The participants gained technological content knowledge in the use of both Weblogs and WebQuests. The use of editing and sound recording function represents technological content knowledge. They worked in groups collaboratively, and these examples provide evidence that working as a group and discussing the lesson provided opportunities for the pre-service teachers' technological knowledge to develop into technological content knowledge as they take advantage of what technological tools can do efficiently in language teaching.

Providing an effective way to convey the use of the technology to the pre-service teachers involves technological pedagogical knowledge. This includes identifying authoring tools used to enhance student learning such as Dreamweaver software and hot potatoes testing software. By experiencing these different multimedia applications, they realized that they could represent many concepts to their students through technology. The pre-service teachers understood and valued the importance of giving the students multiple representations for thinking about and gaining understanding about abstract concepts.

TPCK involves an overlapping of technology, pedagogy, and content knowledge that incorporates the knowledge necessary for the integration of technology in teaching (Mishra & Koehler, 2006). Development of TPCK in the participants is evidenced in their analysis of different functions of TPCK such as understanding what it means to teach English language with technology; knowledge of instructional strategies; knowledge of students' learning; knowledge of materials that integrate technology in language teaching.

In general, the Computer-assisted language learning course was confirmed as being helpful in developing pre-service teachers' TPCK and supporting them in practicing their TPCK. In addition to that, all of the pr-eservice teaches recalled how their instructors modeled the use of technology in class and were inspired to integrate technology into more meaningful ways.

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